DRISI

Caltrans Division of Research, Innovation and System Information

Research Results

Implementing Automated Machinery for Sealing Pavement Cracks

Sealzall machine increases productivity and safety when repairing longitudinal highway cracks

Maintenance

NOVEMBER 2014

Project Title:
Deployment Support and Caltrans' Implementation of the Sealzall Machine

Task Number: 2215

Start Date: July 1, 2012

Completion Date: December 31, 2013

Product Category: Evaluation of new commercial products to determine if they meet Caltrans needs; new tool; improved procedure

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WHAT WAS THE NEED?

The majority of highway cracks are longitudinal, running the length of the roadway parallel to the pavement centerline. Unsealed cracks can lead to premature pavement deterioration. Timely maintenance helps retain the structural integrity of the roadway and extends the time between pavement replacements. Caltrans currently seals all cracks manually, a labor-intensive process requiring several dedicated crews and lane closures. Workers are also exposed to highway traffic and hot sealant material. To improve worker safety and increase productivity, Caltrans explored mechanizing crack-sealing operations.

WHAT WAS OUR GOAL?

The goal was to test innovative crack-sealing equipment capable of high-production longitudinal sealing and enhanced manual in-lane sealing to increase efficiency and worker safety.

The Sealzall longitudinal sealing operation produces a uniform and smooth seal, shown here on Interstate 15 in Escondido.

WHAT DID WE DO?

Caltrans, in partnership with the University of California, Davis Advanced Highway Maintenance & Construction Technology Research Center, field-tested the Sealzall automated crack-sealing machine. District 11 maintenance crews used the machinery for one year and provided the researchers feedback. The research team summarized the results, which includes recommendations for preparing and cleaning cracks, suggested options for future Sealzall deployments, and a lifecycle cost-benefit analysis.

Caltrans

Caltrans provides a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

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WHAT WAS THE OUTCOME?

The Sealzall is much more productive and efficient than the manual method of longitudinal crack sealing. Maintenance operators inside the cab of the Sealzall truck can seal 5–8 linear miles in one day, compared to only one linear mile a day manually. Operation is continuous, with moving lane closures, thus reducing the need to coordinate with the California Highway Patrol for fixed lane closures and the resulting impact on traffic.

Caltrans District 11 maintenance managers requested that the Sealzall deployment continue to complete two current projects to longitudinally seal about 200 lane miles of new shoulder joints.

WHAT IS THE BENEFIT?

The Sealzall increases productivity by about 500% over manual methods while eliminating worker exposure to traffic and reducing the need for lane closures. Crew members work from within the truck and do not need to interact with high temperature sealant. Because the machine operates in a continuous motion, traffic delays are minimized. In addition to the safety features, Caltrans could gain substantial savings per year in longitudinal crack sealing costs.

Sealzall also improves the safety of in-lane manual sealing operations because crew members are more clearly in view of oncoming traffic.

Cost to Seal 2,161 Longitudinal Lane Miles per Year		
	Sealzall	**Manually**
Sealant cost	$1,452,192	$1,452,192
Number of crews (5-person crew on average)	2	12
Operational cost rate per crew	$1,696	$1,619
Operational cost per day	$3,392	$19,428
Average number of miles sealed per day	6	1
Total operational cost (180 work days/year)	$610,560	$3,497,040
Exposure safety cost per year (workers on foot)	$0	$42,100
Injury costs (workers on foot)	$0	$9,366
Traffic impact cost per year	$207,115	$1,242,575
Calculated total cost per year	$2,269,867	$6,243,273
Caltrans cost savings per year	$4 million	

Data results from the Caltrans District 11 deployment trials

LEARN MORE

To view the complete report:
http://ahmct.ucdavis.edu/pdf/UCD-ARR-13-06-30-03.pdf

For additional information about the project:
http://ahmct.ucdavis.edu/wp-content/uploads/pdf/SealzallDeployment%202-pager.pdf

Results of a Sealzall manual sealing operation on Interstate 8 in Winterhaven